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The purpose of the 6-year Minnesota Student Characteristics and Occupationally related Education Project (MINI-SCORE) is to identify criteria which are useful to counselors and others in the selection and counseling of post-high school vocational-technical students as they choose specific vocational-technical curriculums. Data were collected on 6,400 applicants with a variety of instruments, and three preliminary analyses were conducted. Descriptive data and implications for vocational guidance are reported. Project MINI-SCORE is scheduled for completion in 1970. (CH)

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Project MINI-SCORE:* Some Preliminary Implications for Vocational Guidance

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If one reads current reviews of the literature concerned with counseling vocational students, (Ghiselli 1966, Prediger 1967) it becomes apparent that little integrated research has been done to assess the interrelationships among various measures of abilities and needs and how these measures may be used effectively in the counseling process when dealing with many different training programs assumed to prepare persons for different occupational families.

Project MINI-SCORE (Minnesota Student Characteristics and Occupationally Related Education) was begun at the University of Minnesota in 1966 in an attempt to study the problem of selecting and counseling vocational students for post-high school vocational programs in such a way as to maximize the investigation of these interrelationships.

Project MINI-SCORE, a six year project funded by the U.S. Office of Education, is being conducted by two staff members of the Department of Industrial Education, University of Minnesota. The primary purpose of the project is to identify criteria which are useful to counselors and others in

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the selection and counseling of post-high school vocational-technical students as they seek to pursue specific vocational-technical curricula. Data are gathered through comprehensive measurement of basic competencies and selected characteristics. The data will be analyzed to determine which and how much of each element is useful to the process of selecting and admitting applicants to the full time vocational-technical courses offered in the area vocational-technical schools of Minnesota.

The project had been divided into four overlapping phases. Phase one involves the testing all applicants to the full-time, day trade programs conducted in the area vocational-technical schools of the state of Minnesota. Data are being gathered from all applicants to 56 relatively homogeneous groups of training groups. The data gathering instruments consist of: (1) a personal information sheet, (2) the written portions of the GATB (Form B), (3) the Minnesota Vocational Interest Inventory (MVII), (4) the Minnesota Importance Questionnaire (MIQ), and (5) the Vocational Development Inventory (VDI). Minnesota Scholastic Aptitude Test (MSAT) scores are obtained from the Minnesota Statewide Testing Program since virtually all high school students in Minnesota take the test during the junior year.

Phase two of the project involves keeping accurate records on each of the individuals tested to determine what happens to them after testing. For example, are they accepted in an area vocational-technical school or are they rejected? If accepted, do they leave the program before completion or do they graduate?

The follow-up or Phase three of the project occurs twelve months after students graduate from one of the full-time programs of the area vocational-technical schools. These students as well as their employers are contacted to determine the extent to which they have become successful employees.

Phase four of the project will provide for the analysis of the data and writing the final report.

During the past two years, project personnel have established the necessary machinery to test applicants to the area vocational-technical schools and to process the test data. Approximately 16,000 students have been tested and their test data have been processed. Follow-up procedures have been developed and were put into operation during the summer of 1968.

First Analysis

Three preliminary analyses of the data have been conducted. The first preliminary analysis (Nelson and Pucel 1967) was done to gather descriptive data on the type of people applying to the area vocational schools of Minnesota all of which are post-high school institutions.

The population used in this analysis was 6,400 applicants to the 24 cooperating Area Vocational-Technical Schools of Minnesota during the period from October 1, 1966 to July 1, 1967. The first analysis indicated that about 69% of the applicants were 18 years of age or under, 23% were between 19 and 21 and 8% were over 21 years of age. About 57% of the applicants were boys and 43% were girls. Most, 92.5%, of the applicants were high school graduates, 7% had between 9 and 11 years of education and only 0.5% had eight years or less. About 93% had no dependents and only 7% were married. About 43% of the applicants indicated they had some prior high school vocational preparation and 4% indicated they had prior post-high school vocational training. About 77% indicated that they had no previous work experience related to the program they wished to enter although about 57% indicated they had unrelated work experience.

The findings of the first analysis indicate that many girls as well as boys apply for admission to the area vocational schools of Minnesota. They

are well educated, most of them are high school graduates and they typically apply immediately after high school. Few are married and few are supporting other dependents. Many of them have had some work experience and indicated that they had some form of vocational training in high school.

Second Analysis

The population used in both the second and third preliminary analyses consisted of 1,391 students newly enrolled during the fall of 1966 in one of eighteen different vocational-technical curricula at the Minnesota Area Vocational-Technical Schools. Table I lists the curriculum groups used in the analyses and the number of subjects in each group.

The second preliminary analysis (Pucel and Nelson 1967) investigated the intercorrelations that existed between measures derived from the seven different instruments used in the project. The second also investigated whether or not each measure individually could differentiate between a group of individuals entering one program and groups of individuals entering other programs. The answers to each of the questions raised in the second analysis were encouraging. All of the instruments appeared to be measuring relatively independent variables and each was capable of significantly differentiating at least two of the 18 different curriculum groups at the .05 level as measured by a two-sample T-test.

The criterion used to judge whether or not two factors measured by two different instruments were relatively independent was a correlation of .55. A correlation of .55 between two sets of scores indicates that the two measures have 30.25% common variance; or conversely, 69.75% of what each measures is independent of the other. For purposes of the preliminary analysis, approximately 70% non-overlap or independence was judged to be sufficient to indicate that two measures were relatively independent.

Table I

Population Used For
Second and Third Preliminary Analyses

Curriculum	N		N
1. Practical Nursing	67	10. Mechanical Drafting and Design	52
2. Data Processing	45	11. Sales	31
3. Secretarial Training	247	12. Power and Home Electricity	51
4. Electronics	56	13. Printing and Graphic Arts	25
5. Cosmetology	33	14. Carpentry	47
6. Accounting	164	15. Machine Shop	80
7. Clerical Training	167	16. Automotive	139
8. Architectural Drafting	41	17. Agri-Technology	29
9. Fluid Power Technology	30	18. Welding	87
		TOTAL	1,391

A review of a sample of four of the eighteen correlation matrices indicated that none of the factors measured by one instrument correlated above .55 with factors of another instrument except the Minnesota Scholastic Aptitude Test Score and the GATB Verbal Aptitude Score. A review of the correlation between these two scores for each of the eighteen curricula indicated that they correlated above .55 for seven curricula. Although these two scores appear to be somewhat related, the relationship does not appear consistent enough to reject either instrument. Therefore, both are currently being retained in the test battery.

Third Analysis

A third preliminary analysis of the data investigated the commonalities between groups enrolled in different vocational programs with respect to interests, aptitudes, job needs and personality factors.

Profiles for each of the eighteen curricula were constructed using standard scores for each of the multifactor instruments used in the project (MVII, 16-PF, MIQ and GATB). A combined profile was also constructed for each curriculum using all of the scales on all of the instruments indicated above. The commonalities between the profiles were determined by using DuMas coefficient of profile similarity.* By inspection, profiles were then grouped on the basis of profile similarity coefficients. Each of the curriculum groups were randomly assigned a number before the profile coefficients were computed and the groups constructed. After all groupings were constructed for each instrument and the combination of instruments, the numbered curricula were translated back to names. The above procedure was used in an attempt to eliminate the bias which might occur during grouping because the persons involved in constructing the groupings might have stereotype notions about the occupations.

The following curricula were grouped together using data obtained from the different instruments used in the project.

1. General Aptitude Test Battery (seven aptitude scores obtained from written portions).

   a. GROUP 1

      Electronics
      Power and Home Electricity

   b. GROUP 2

      Architectural Drafting
      Fluid Power Technology
      Data Processing

*A discussion of this technique as well as alternative techniques can be found in the book, Multivariate Statistics for Personnel Classification (Rulon, Tiedeman, Tatsuoka, and Langmuir, 1967.

c. GROUP 3

Carpentry
Automotive
Printing and Graphic Arts
Mechanical Drafting and Design
Welding
Sales
Machine Shop

d. GROUP 4

Practical Nursing
Cosmetology
Agri-Technology
Clerical Training
Secretarial Training
Accounting

2. Minnesota Vocational Interest Inventory (nine homogeneous scales).

a. GROUP 1

Electronics
Printing and Graphic Arts
Power and Home Electricity
Architectural Drafting
Welding
Machine Shop
Automotive
Carpentry
Mechanical Drafting and Design
Fluid Power Technology
Agri-Technology

b. GROUP 2

Practical Nursing
Sales
Accounting
Clerical Training
Data Processing
Secretarial Training
Cosmetology

3. Sixteen Personality Factors Questionnaire (16 personality factor scales).

a. GROUP 1

Mechanical Drafting and Design
Fluid Power Technology
Data Processing

b. GROUP 2

Electronics
Power and Home Electricity
Printing and Graphic Arts
Architectural Drafting
Agri-Technology

c. GROUP 3

Carpentry
Automotive
Welding
Machine Shop

d. GROUP 4

Practical Nursing
Cosmetology
Clerical Training
Secretarial Training
Accounting

e. GROUP 5

Sales

4. Minnesota Importance Questionnaire (thirty needs scales)

a. GROUP 1

Electronics
Data Processing

b. GROUP 2

Architectural Drafting
Agri-Technology

c. GROUP 3

Power and Home Electricity
Carpentry
Automotive
Machine Shop
Welding
Fluid Power Technology

d. GROUP 4

Practical Nursing
Cosmetology
Clerical Training
Secretarial Training
Accounting

e. The following programs did not fall into any groupings.

Printing and Graphic Arts
Mechanical Drafting and Design
Sales

Based upon the combined profiles using all of the scales of the above instruments, the following clusters were found. The total number of dimensions in each profile was 62.

a. GROUP 1

Electronics
Data Processing

b. GROUP 2

Power and Home Electricity
Carpentry
Automotive
Machine Shop
Welding
Fluid Power Technology
Architectural Drafting
Mechanical Drafting and Design
Agri-Technology
Printing and Graphic Arts

c. GROUP 3

Practical Nursing
Cosmetology
Accounting
Clerical Training
Secretarial Training
Sales

Based upon the above curriculum groupings derived from profile comparisons by test, as well as for the combination of the tests, some curricula consistently group together. The groups derived from the comparison of the combined profiles appear to represent a summary of all of the profile groups derived from the individual tests. The curricula appear to consistently group in terms of trade and industrial curricula and business and social service curricula.

Essentially the same curricula cluster together regardless of the test used except for sales and agri-technology. This suggests that individuals in the groups are similar on many dimensions. They have similar needs, interests, abilities, and personalities as defined by the instruments used in this study. This does not mean that they are identical. Curricula within a group have profiles more similar to curricula in the group than they do to curricula outside the group.

It appears that certain jobs appeal to persons with similar personal characteristics as indicated by the fact that, with the data analyzed here, it has been possible to empirically cluster jobs based upon the characteristics of persons training for them. Such a finding with such a large number of variables could have direct significant implications for vocational counseling procedures.

If additional research of the kind just described continues to buttress these preliminary findings, persons could be advised in terms of clusters of jobs which appeal to learners possessed of similar profiles constituted of the many dimensions of aptitude, interest and personality. Using this approach, the counseling procedure would allow the counselee to identify a number of different jobs within the cluster in which he might consider interning and in which he would have reasonable expectations of succeeding. The data base which present-day counselors must work from makes the advising of counselees in this manner very difficult if not in fact wholly impossible.

In the future, Project MINI-SCORE investigators, will through the analysis of large amounts of data on applicants, graduates, drop-outs, successful workers and others, be able to provide many more analyses of the basic data, comparable to the three reported here.

The major analyses of nearly twenty thousand cases which have been tested, will be undertaken upon completion of the follow-up procedures. The data will

make possible the development of expectancy tables and test instrument norms applicable to all major vocational-technical curriulum areas as well as suggestions for counselors in the use and interpretation of these tables and norms. Distributions of students on all test instruments by curriculum areas for sub-groups such as successful graduates and workers as well as drop-outs, course changers, unemployable or employable in areas for which trained and similar groups will be made available.

Project MINI-SCORE, when completed about January 1, 1970, will provide a wide variety of findings useful to counselors as they attempt to help advise potential students in terms of occupational areas of study available through the Area Vocational-Technical School programs. There is every expectation that these materials will add significantly to the information base used in the counseling of vocational students and that there may emerge, from this development, a greatly strengthened program for these students.

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